

TECHNICAL DATA SHEET

DS0132 rev 37

Cylon® FBXi Series



DESCRIPTION

The **FBXi Series** is a range of freely programmable BACnet® Controllers with native BACnet/IP communications support. BTL listed (B-BC) with built in advanced cybersecurity technology and multi-protocol support, the **FBXi** series is ideally suited as integration platform for HVAC equipment and electrical systems including lighting control and metering applications.

With support for up to sixteen **FLX (Field Level eXpansion)** series extension modules equipped with UniPut technology and dedicated **FusionAir** Sensor port, the **FBXi** series provides power and flexibility for complex plant applications. Local override function through **HOA** switches is available on the **-H** variants.

For medium sized plants, the **-8R8** variants feature built-in 8 UniPuts™ with Relay and 8 Universal Inputs

APPLICATION

The **FBXi** Series supports routing of BACnet MS/TP to BACnet/IP or communicates on Modbus TCP and Modbus RTU as clients.

It is designed for a wide range of energy management applications for intelligent control of:

- HVAC equipment such as Central Plant, Boilers, Chillers, Cooling Towers, Pump Systems, Air Handling Units (Constant Volume, Variable Air Volume and Multi-zone), and Rooftop Units,
- Electrical systems such as lighting control, variable frequency drives and metering.

The controller accommodates available pre-engineered strategies or can be tailored to custom applications using **CXproHD** programming software.

FLX I/O Expansion Module

(-H variants include Hand/Off/Auto Local Override Function)

FLX-4R4(-H) 4 UniPuts with Relay, 4 Universal Inputs

FLX-8R8(-H) 8 UniPuts with Relay, 8 Universal Inputs

FLX-16DI 16 Digital Inputs

FLX-PS24 Power Supply Module

FLX-RMC Remote Module Connector

Connectivity for Complex Plants

BACnet/IP communications

with dual port Ethernet switch (star or daisy chain topology) and support for both DHCP and Static IP

Network Time Protocol (NTP) support

Multi-protocol communications support

for BACnet MS/TP, Modbus TCP, Modbus RTU, HTTPS for configuration

FusionAir Sensor Port

Enables IAQ applications using CO₂ and VOC sensors in FusionAir

Touch Free user mobile app

Dual IP ports

Failsafe switchover of IP communications in event of power interruption

Control Capability for Complex Plants

Flexible onboard UniPut technology

allows expandable I/O configurations from 16 to 96 points through connected FLX modules

UniPut™

ABB's patented technology that can be configured as analog / digital outputs or analog inputs automatically by the downloaded strategy

FLX -H

Local HOA switches provides easy manual override capability for simple checkout and override

LED status on all I/O channels

provides indication of fault or override status

Compact form factor for Medium Complexity

-8R8 and 8R8-H versions with built in FLX control points for medium complexity plant applications

PRODUCT SELECTION CHART

		FBXi-X256/X48	FBXi-8R8-X96	FBXi-8R8-H-X96	FLX-4R4	FLX-4R4-H	FLX-8R8	FLX-8R8-H	FLX-16DI
Service		Main Controller	Main Controller	Main Controller	Expansion Module	Expansion Module	Expansion Module	Expansion Module	Expansion Module
I/O Point Qty	UniPuts with Relay ⁽¹⁾	0	8	8	4	4	8	8	0
	Universal Inputs	0	8	8	4	4	8	8	0
	Digital Inputs	0	0	0	0	0	0	0	16
Input Options	Voltage 0 ... 10 V @ 40 kΩ		✓	✓	✓	✓	✓	✓	
	Resistance 0 ... 450 kΩ		✓	✓	✓	✓	✓	✓	
	Temperature -40 °C ... +110 °C (-40 °F ... +230 °F)		✓	✓	✓	✓	✓	✓	
	Current 0 ... 20 mA @ 390 Ω		✓	✓	✓	✓	✓	✓	
	Digital Volt-Free contact		✓	✓	✓	✓	✓	✓	✓
	Digital 24 V AC detect		UniPuts only	UniPuts only	UniPuts only	UniPuts only	UniPuts only	UniPuts only	
	Pulse counting		✓	✓	✓	✓	✓	✓	✓
Output Options	Analog 0 ... 10 V		✓	✓	✓	✓	✓	✓	
	Digital 0 ... 10 V		✓	✓	✓	✓	✓	✓	
	Relay Contacts 24 V AC		✓	✓	✓	✓	✓	✓	
HOA Switch & Pot.				✓		✓		✓	
18 V Aux Power			✓	✓	✓	✓	✓	✓	✓
BACnet MS/TP-to-IP Routing		✓	✓	✓					
Modbus TCP⁽²⁾		✓	✓	✓					
RS-485 Port 1⁽³⁾		BACnet MS/TP or Modbus RTU	BACnet MS/TP or Modbus RTU	BACnet MS/TP or Modbus RTU					
RS-485 Port 2⁽³⁾		BACnet MS/TP, Modbus RTU or Sensor Bus	BACnet MS/TP, Modbus RTU or Sensor Bus	BACnet MS/TP, Modbus RTU or Sensor Bus					
Local Sensor bus		✓	✓	✓					

Note (1) : UniPuts are software configurable for point types AI, DI, AO or DO-R.

Note (2) : FBXi supports a maximum of 640 Modbus point (FBXi-X256), 450 Modbus point (FBXi-8R8(-H)-X96), 320 Modbus points (FBXi-X48) which can be a combination of Modbus RTU or TCP.

Note (3) : The controller supports different protocols on the two RS485 ports at the same time. Each RS-485 Port supports one communication protocol at a time.

Note: FBXi acts only as a Modbus Client for Modbus TCP communications, and only as a Modbus Master for Modbus RTU communications.

Note: Routing of Modbus RTU to Modbus TCP via strategies in CXpro^{HD}

SPECIFICATIONS

MECHANICAL

Size (excluding terminal plugs)	166 x 89.5 x 57 mm [6.54 x 3.5 x 2.24"]
Enclosure	Flame-Retardant ABS DIN 43880 type-2 compatible Enclosure IP 20
Mounting	DIN rail

CONNECTION

Note: Use Copper or Copper Clad Aluminum 70 °C (158 °F) conductors only.

Terminals	PCB mounted plug terminal connections
Conductor Area	Max: AWG 12 (3.31 mm ²) Min: AWG 22 (0.355 mm ²)

ENVIRONMENT

Note: This equipment is intended for field installation within an enclosure.

Ambient Temperature	-25 °C ... 50 °C (-13 °F ... 122 °F)
Ambient Humidity	0% ... 90% RH non-condensing
Storage Temperature	-30 °C ... +70 °C (-22 °F ... 158 °F)
EMC Immunity	EN 61326-1: 2013
EMC Emission	EN 61326-1: 2013 EN 61000-3-2: 2014 EN 61000-3-3: 2013
Approvals	UL Listed (CDN & US) UL916 Energy Management Equipment – File No. E176435
Safety	CE Approved

ELECTRICAL

Supply Requirements	24 V AC/DC ±20 % 50/60 Hz	
Supply	Without onboard IO	With onboard IO
Rating	FBXi	20 VA (no FLX modules)
	FBXi + 1 x FLX	32 VA
	FBXi + 2 x FLX	44 VA
	FBXi + 3 x FLX	56 VA
	FBXi + 4 x FLX	68 VA
FLX Power Connection	Proprietary FLX bus connector carries power and communications from FBXi unit to power to up to 3 FLX modules (with onboard IO) or 4 FLX modules (without onboard IO). Using FLX-PS24 units allows 4 additional FLX modules per FLX-PS24 unit, up to a maximum of 16 FLX modules.	
Auxiliary Power	18 V DC / 60 mA output	

PROCESSOR

Type	TI Sitara AM335X Dual-core ARM Cortex A8
Clock Speed	1 GHz
System Memory	4 GB eMMC Flash + 512 MB DDR3 DRAM
Real-Time Clock	Yes, backed for 7 days typical

COMMUNICATIONS

Ethernet ports	Dual Switched 10/100BASE-TX (RJ45) Addressing: IP address or Hostname / DHCP Client or Static IP Connection Topology: Daisy-chain, supports Spanning Tree Modbus TCP, BACnet/IP
USB ports	2 x Type-A USB connectors USB 2.0 5 V DC 2.5W
RS485 Port 1	Software selectable BACnet MS/TP or Modbus RTU. RS485 @ 9K6,19K2, 38K4(default), 57K6, 76K8 or 115k2 Baud. Max cable length 1.2 km @ default ¼ unit load device.
Sensor/RS485 Port 2	Software selectable BACnet MS/TP, Modbus RTU or FusionAir sensor bus. RS485 @ 9K6,19K2, 38K4(default), 57K6, 76K8 or 115k2 Baud. Max cable length 1.2 km @ default ¼ unit load device. RS485 sensor bus with a maximum cable length 500 m. Supports ABB Cylon® room sensors.
Modbus	Total points – Modbus RTU or TCP/IP: FBXi-X256 : 640 FBXi-8R8(-H)-X96: 450 FBXi-X48 : 320
FLX bus	115.2K Baud Max bus length (including extension cables): 30 m / 100 ft. using 18 AWG conductors 15 m / 50 ft. using 22 AWG conductors
FLX bus Connection	FLX bus connector carries inter-module communications and module power
Supported FLX modules	FBXi-X256 : 16 modules FBXi-8R8(-H)-X96: 5 modules FBXi-X48 : 3 modules
Supported FLX hardware points	FBXi-X256 : 256 points FBXi-8R8(-H)-X96: 96 points FBXi-X48 : 48 points

INPUTS / OUTPUTS

Note: Shielded cable is recommended for all input connections.

UniPuts™ with Relay



When configured as Input:

Analog Input

Range: 0 ... 10 V @ 40 kΩ
Accuracy: ±0.5% full scale [50mV]

Resistance measurement

Range: 0 ... 450 kΩ
Accuracy: ±0.5% of measured resistance

Temperature measurement

Range: -40 °C ... +110 °C (-40 °F ... +230 °F)
Accuracy: 10k NTC sensors (e.g. 10k Type 2 (10K3A1) or 10k Type 3 (10K4A1))
±0.3 °C, -40 to 90 °C (-40°F to 194°F); ±0.4 °C > 90 °C (194°F)

Current input

Range: 0 ... 20 mA @ 390 Ω

Note: Current Input requires user-supplied external 390 Ω resistance.

Accuracy: depends on user supplied external resistor
Digital Volt-Free contact, 2 mA contact-wetting current
Digital 24 V AC detect
Pulse counting up to 20 Hz, 25 ms - 25 ms

When configured as Output:

Analog Output 0 ... 10 V @ 20 mA max load, 12-bit resolution
Digital Output 0 ... 10 V @ 20 mA max load
Relay Contacts with ability to switch up to 24 V AC
Maximum Load: 24 V AC, 2 (1) A resistive (inductive) for all relay contacts

Universal Inputs



Analog Input

Range: 0 ... 10 V @ 130 kΩ
Accuracy: ±0.5% full scale [50mV]

Resistance measurement

Range: 0 ... 450 kΩ
Accuracy: ±0.5% of measured resistance

Temperature measurement

Range: -40 °C ... +110 °C (-40 °F ... +230 °F)
Accuracy: 10k NTC sensors (e.g. 10k Type 2 (10K3A1) or 10k Type 3 (10K4A1))
±0.3 °C, -40 to 90 °C (-40°F to 194°F); ±0.4 °C > 90 °C (194°F)

Current input

Range: 0 ... 20 mA @ 390 Ω
Accuracy: ±0.5% full scale [100µA]

Digital Volt-Free contact, 2 mA contact-wetting current
Pulse counting up to 20 Hz, 25 ms - 25 ms

Notes: 1) All inputs and outputs are protected against short circuit, as well as over-voltage up to 24 V AC.
2) Inputs use on-board 16-bit analog to digital converter.
3) 18 V DC supply, max 60 mA per FBXi unit, is available for powering sensors.

SOFTWARE FEATURES

Maximum number of Strategy Modules	FBXi-X256 :	5000
	FBXi-X48 :	2500
	FBXi-8R8(-H)-X96:	3500
Maximum number of Trendlog Modules	255	
Entries per Trendlog	1024	
Maximum BACnet Schedules	16	
Maximum number of Exposable BACnet Points	FBXi-X256 :	5000
	FBXi-X48 :	1200
	FBXi-8R8(-H)-X96:	2500

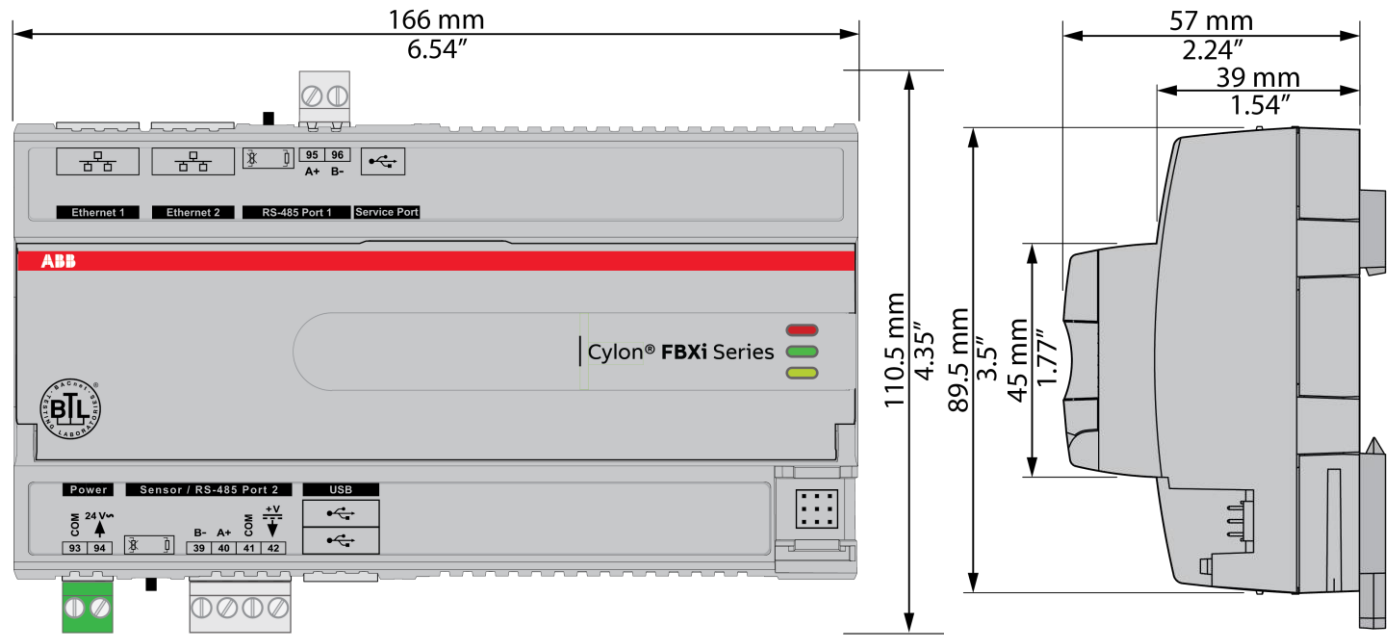
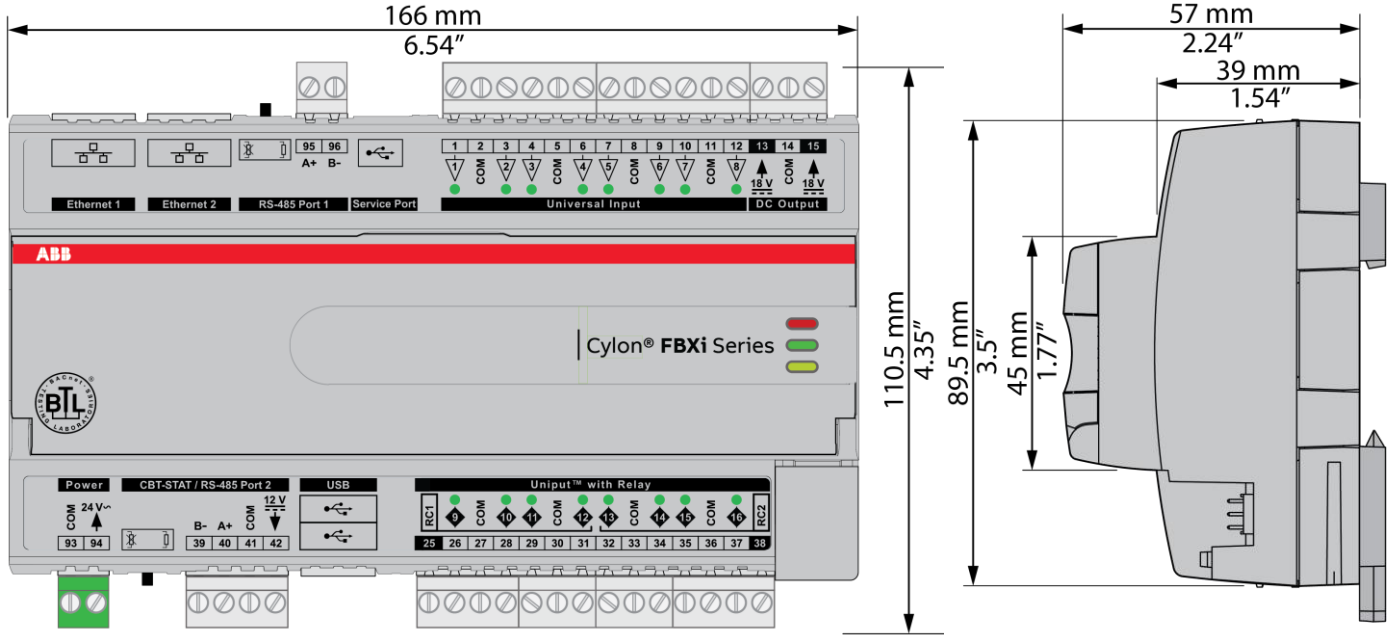
SECURITY

Data Security	Strategy and Set points backed up in Flash
Transport Layer Security	Support for TLS 1.3
Upgrade Security	Upgrade software bundles are signed

INTERFACE

Engineering Software	CXpro ^{HD}	
Touchscreen	eXplore	

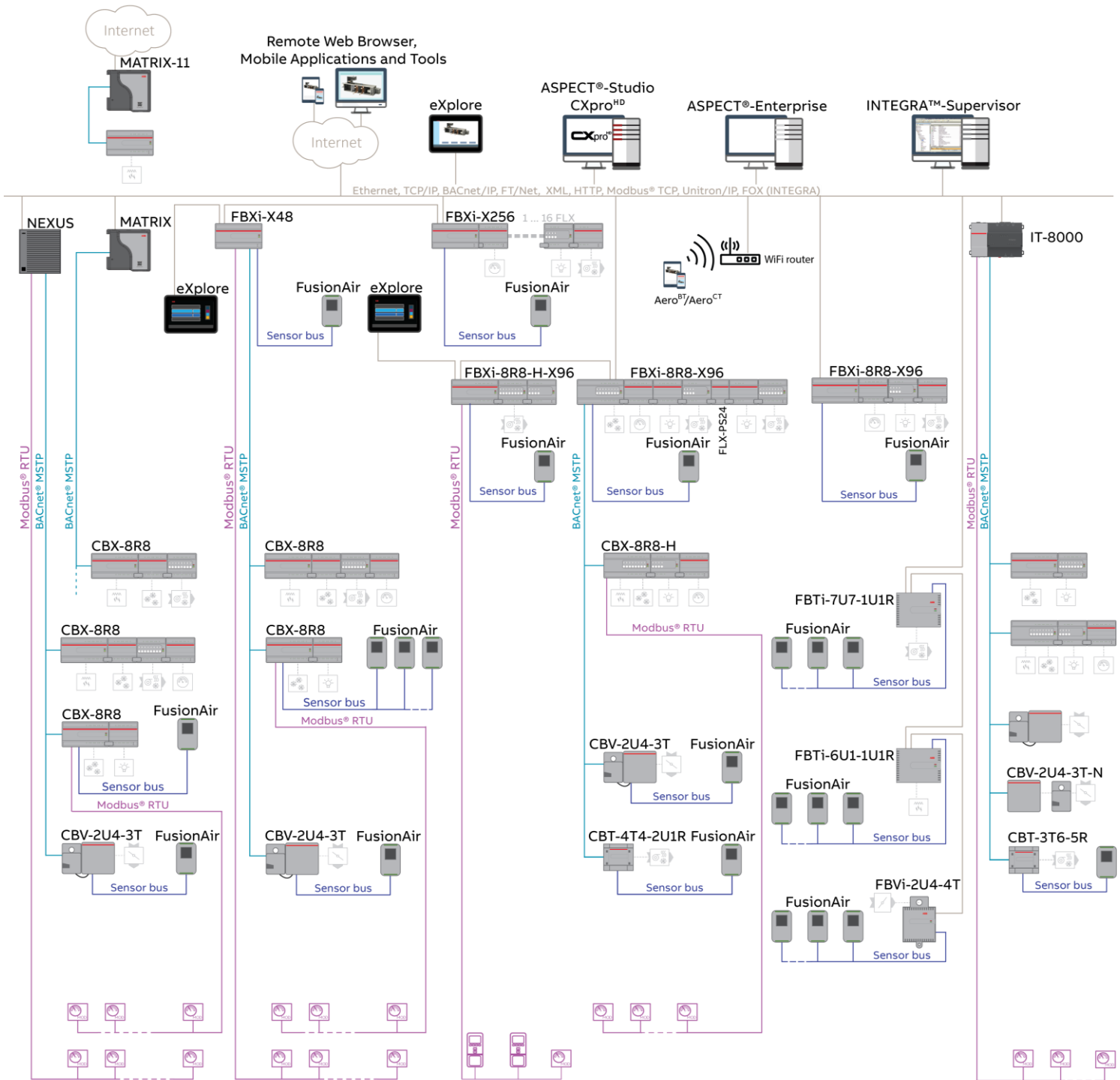
DIMENSIONS



ORDERING INFORMATION

Order Code	Product Name	Description
ABB2CQG201014R1021	FBXi-X256	IP B-BC + 640 Total Modbus Points
ABB2CQG201018R1021	FBXi-X48	IP B-BC + 320 Total Modbus Points
ABB2CQG201029R1011	FBXi-8R8-H-X96	IP B-BC+HOA: 16 I/O + 450 Total Modbus Points
ABB2CQG201028R1011	FBXi-8R8-X96	IP B-BC: 16 I/O + 450 Total Modbus Points

SYSTEM ARCHITECTURE



FBXi / CBXi-8R8 / CBX-8R8	FLX-8R8 -H	FBVi-2U4-4T	INTEGRA Series	FusionAir Smart Sensor
CBXi-8R8-H / CBX-8R8-H	FLX-4R4-H	NEXUS Series	eXplore	CBT-STAT
CBV-2U4-3T	FLX-PS24	MATRIX Series		UCU Room Display
FLX-8R8 / FLX-4R4 / FLX-16DI	CBT-4T4-2U1R			